

Technical Note

X5 INVERTER STRING CONFIGURATION

RULES & DESIGN GUIDELINES

TCL X5 inverter string configuration

This technical note outlines the design constraints, electrical boundaries, and engineering rules for configuring PV string inputs on the BlueArk X5 Commercial & Industrial (C&I) Inverter. Due to the inverter's specific hardware architecture and MPPT tracking algorithms, strict string-matching rules must be observed during system design to maintain system stability, optimize energy yield, and ensure full warranty coverage.

CORE TECHNICAL FINDINGS & CONFIGURATION RULES

Rule / Parameter	Specification & Requirement	Technical Rationale & Impact
Paralleled vs. Single String Consistency	Inverter-Wide Uniformity Required: Paralleled strings and independent/single strings cannot be mixed on the same inverter.	Mixing single and paralleled string topologies across different channels on the same inverter unit is strictly prohibited by hardware architecture constraints.
Maximum Input Current	22.5 A per MPPT Input Channel	Accommodates high-current modern PV modules in single configurations (~10–14 A) or parallel pairs (~20 A) without exceeding DC thermal limits.
Maximum Power per MPPT	16.7 kWp per MPPT Channel	Ensures optimal DC/AC ratio loading across all 6 MPPT trackers without inducing excessive thermal clipping.
Intra-MPPT Uniformity	Each MPPT channel (parallel or independent) must only receive strings with the same orientation and identical series module count to avoid voltage losses.	Parallel inputs on the same MPPT force identical voltage. Voltage mismatches cause circulating currents, power degradation, and unsafe reverse current flow.
Module Type Consistency	In a single MPPT, both connected strings must utilize the exact same module make and model.	Prevents I-V curve distortion and algorithm tracking confusion across the shared tracker.

EXAMPLE X5 STRING CONFIGURATIONS

ASSUMPTIONS

String 1 700V 10A

Parallel strings 700V 20A

MPPT 1		MPPT 2		MPPT 3		MPPT 4		MPPT 5		MPPT 6	
Input 1	Input 2	Input 1	Input 2	Input 1	Input 2	Input 1	Input 2	Input 1	Input 2	Input 1	Input 2

Option A (equal strings)	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	Approved
Option B (paralleled on roof strings)	700V 20A	700V 20A	700V 20A	700V 20A	700V 20A	700V 20A	700V 20A	700V 20A	700V 20A	700V 20A	700V 20A	700V 20A	Approved
Option C (paralleled on roof strings)	700V 20A		700V 20A		700V 20A		700V 20A		700V 20A		700V 20A		Approved
Option D (single strings)	700 V 10A		700 V 10A		700 V 10A		700 V 10A		700 V 10A		700 V 10A		Approved
Option E (single strings)	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A		700 V 10A		700 V 10A		700 V 10A		Approved

Option F (Mixed strings on same MPPT)	700 V 10A	700V 20A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	Not approved
Option G (unequal strings)	700 V 10A	800 V 10A	700 V 10A	800 V 10A	700 V 10A	800 V 10A	700 V 10A	800 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	Not approved
Option H (Mixed strings on same MPPT)	700 V 10A	700 V 10A	700V 20A	700V 20A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	700 V 10A	Not approved

PV STRING CONNNECTION GUIDELINES

Strings	Inverter PV terminal
1	PV 1
2	PV 1, 3
3	PV 1, 3, 5
4	PV 1, 3, 5, 7
5	PV 1, 3, 5, 7, 9
6	PV 1, 3, 5, 7, 9, 11
7	PV 1, 2, 3, 5, 7, 9, 11
8	PV 1, 2, 3, 4, 5, 7, 9, 11
9	PV 1, 2, 3, 4, 5, 6, 7, 9, 11
10	PV 1, 2, 3, 4, 5, 6, 7, 8, 9, 11
11	PV 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
12	PV 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

For example:

A site has 6 PV strings — they're installed at terminals 1, 3, 5, 7, 9, 11.

